

Savannah River Site Waste Disposition Project



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Waste Disposition Project - Mission

Radioactive Liquid Waste - Tank Waste Stabilization and Disposition

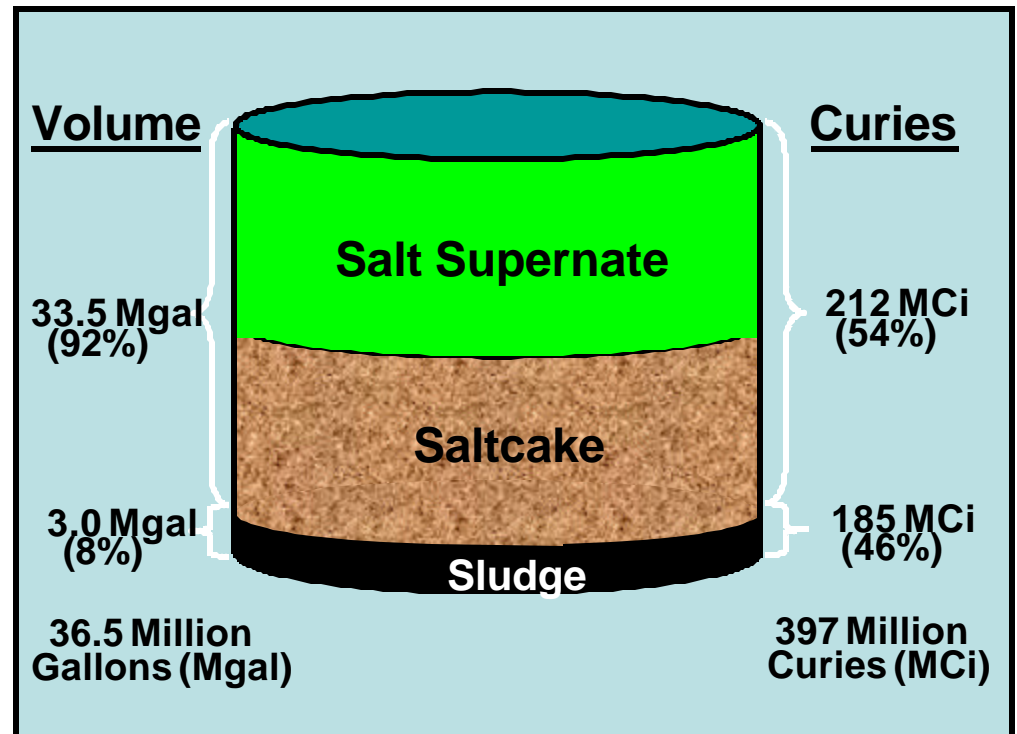
- Disposition 36 million gallons of radioactive liquid waste
- Close 49 underground storage tanks in which the waste now resides



Liquid Waste Background

Facts...

- 2 tanks closed
- 49 tanks remaining to close
 - aging, carbon steel
 - 27 compliant, 22 non-compliant
 - 12 have known leak sites
- Contain half of the radioactivity in the DOE complex
- 1.3 million gallons remaining usable space



Tank Space

Contingency Space: 1.3 Mgal

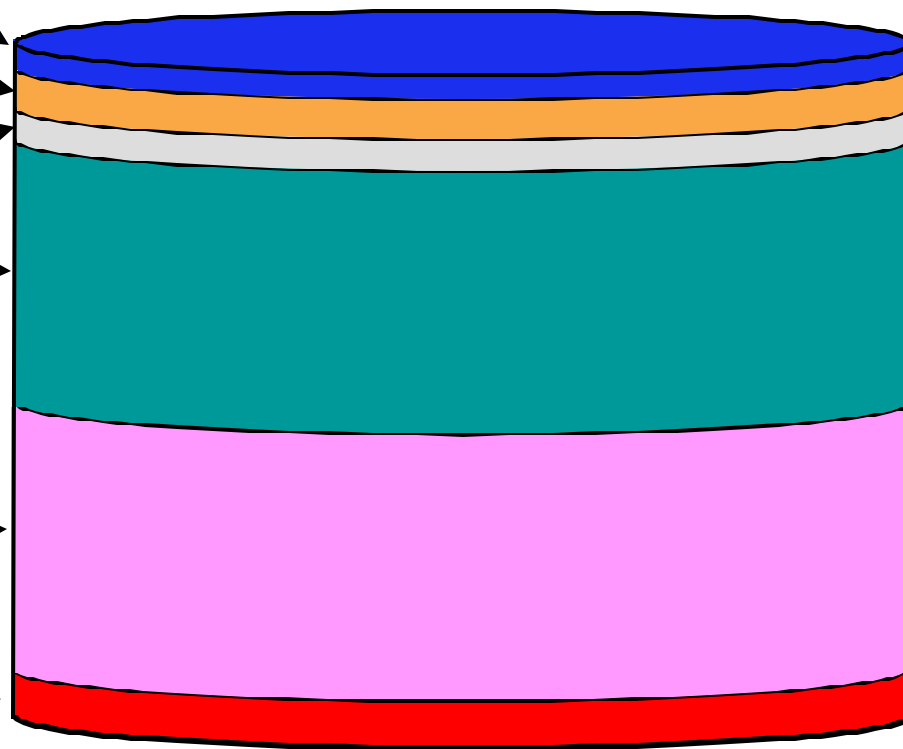
Processing Space: 1.9 Mgal

Usable Space: 1.3 Mgal

Supernate: 16.9 Mgal

Saltcake: 16.6 Mgal

Sludge: 3.0 Mgal



Note: Usable space = Available compliant tank space less processing space and contingency space



Radioactive Liquid Waste Disposition

“Radioactive waste stored in SRS tanks poses the single greatest environmental risk in the State of South Carolina.”

Challenge:

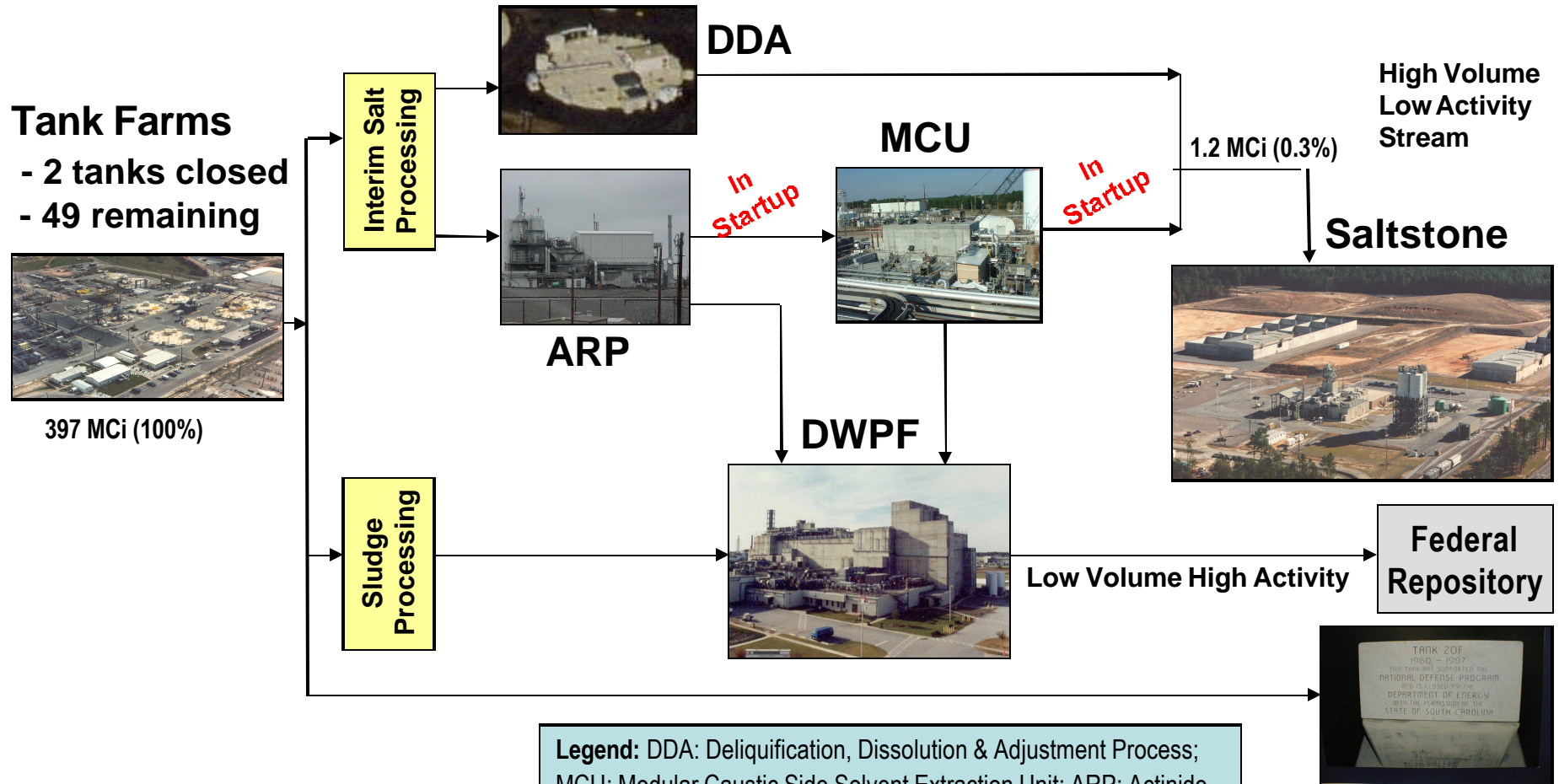
- Safely store, treat and stabilize legacy liquid waste
- Remove waste and close 49 remaining waste tanks

Regulatory Framework

- Federal Facility Agreement (FFA) – Close all non-compliant tanks by Fiscal Year (FY) 2022
- Site Treatment Plan (STP) – remove waste from all tanks by FY 2028
- Tank Closure and waste disposition must meet Section 3116(a) of the Ronald W. Reagan National Defense Authorization Act for FY 2005
- Facilities operated under State-issued permits
- Total radioactivity sent to Saltstone vaults limited to 1.4M Curies



Liquid Waste Processing Today



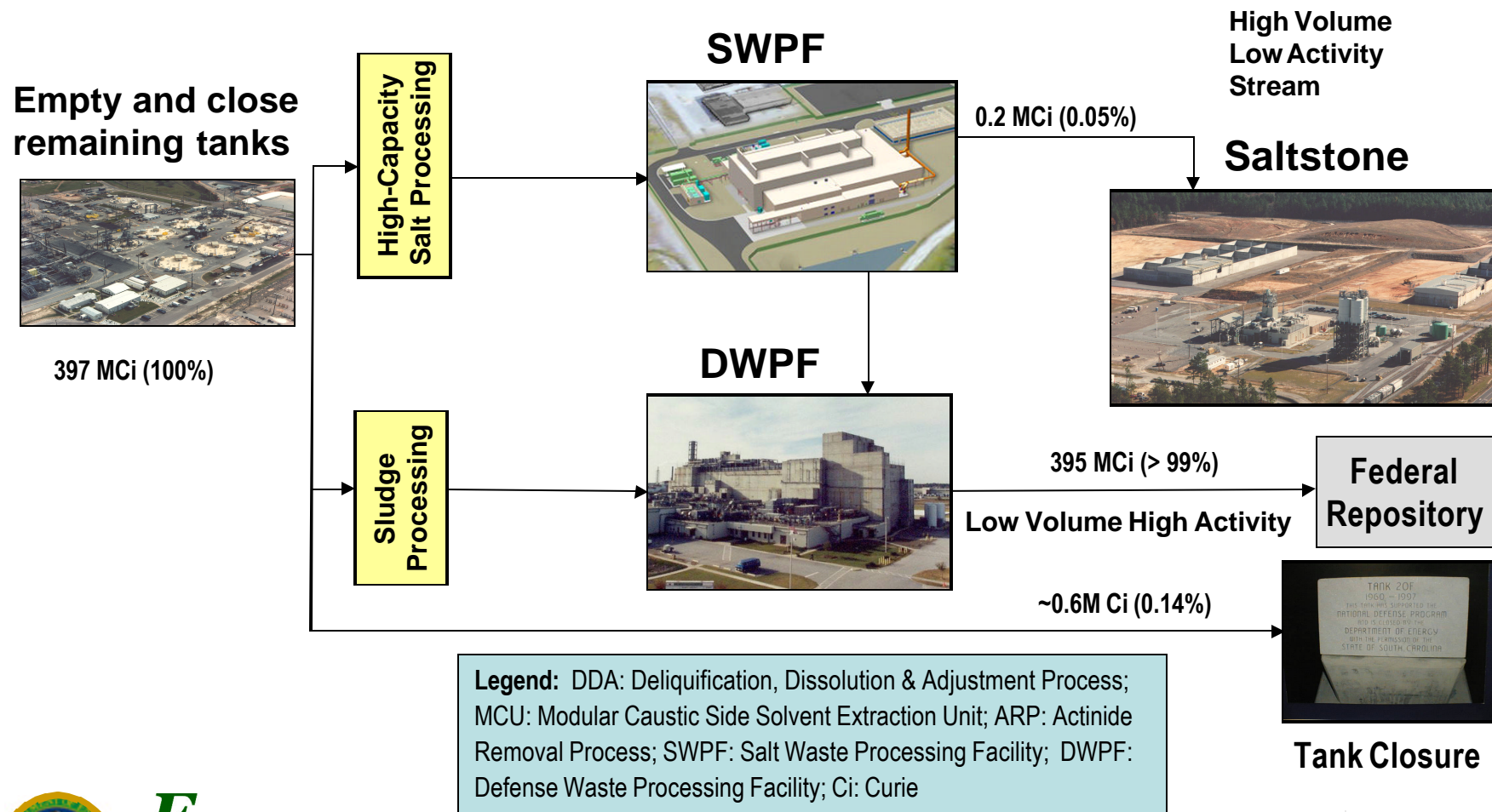
Legend: DDA: Deliquification, Dissolution & Adjustment Process; MCU: Modular Caustic Side Solvent Extraction Unit; ARP: Actinide Removal Process; SWPF: Salt Waste Processing Facility; DWPF: Defense Waste Processing Facility; Ci: Curie



EM Environmental Management
safety ♦ performance ♦ cleanup ♦ closure

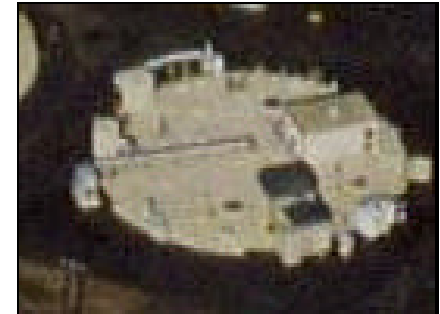
Tank Closure
SRS

Liquid Waste Processing Tomorrow



DDA

Deliquification, Dissolution, and Adjustment (DDA)



- Remove free supernate
- Drain interstitial liquid
- Store for future processing at Salt Waste Processing Facility

- Dissolve saltcake and transfer of salt solution
- Allow solids to settle

- Transfer to Saltstone feed tank
- Aggregate with other Tank Farm waste to meet processing parameters (if required)

- Initiated processing in 3/2007
- Demonstration batches complete
- Currently processing Tank 41 waste



Actinide Removal Process

Objective:

Provide near term capability to remove actinides and strontium (Sr-90) from salt waste at a rate of 1.2 million gallons per year

Scope:

- Process to be conducted in two existing modified site facilities (241-96H and 512-S)
- Involves introduction of mono-sodium titanate (MST) into the strike tanks in 241-96H filled with salt solution from Tank 49 followed by filtration of adsorbed actinides and Sr-90

Status:

- Completed integrated runs 11/07
- Operational readiness review complete
- Hot startup in progress



MCU

Objectives:

- Remove Cesium (Cs-137) from clarified salt waste received from the ARP
- Develop operating experience on a large-scale CSSX process to optimize the startup and initial operations of SWPF

Scope:

- MCU uses the same technology and similar equipment as the SWPF
- MCU will provide Cs-137 removal capability (decontamination factor of ~100) from about 1.2 million gallons of salt waste per year

Status:

- Completed integrated runs 11/07
- Operational readiness complete
- Hot startup in progress



Tank 48 Recovery

Objectives:

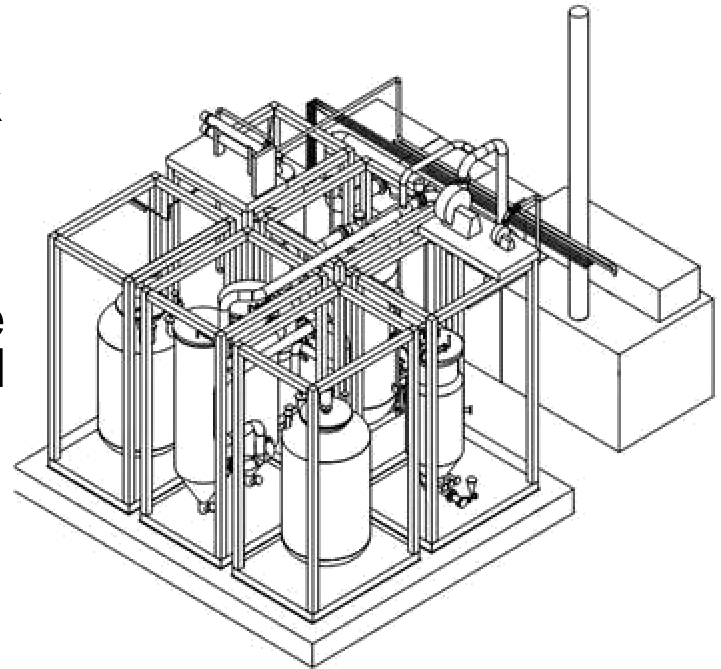
- Treat 240,000 gallons of highly radioactive liquid waste that also contains about 21,800 kg of organic compounds
- Return 1.3 million gallons of vital tank space to Tank Farm service

Scope:

- Tank 48 Treatment Process will provide the capability to treat salt waste and destroy the organics
- Tank 48 will serve as feed tank for SWPF

Status:

- Critical Decision (CD) 1 approved 3/08
- Project completion targeted for 2012 to support SWPF startup



SWPF

Objective:

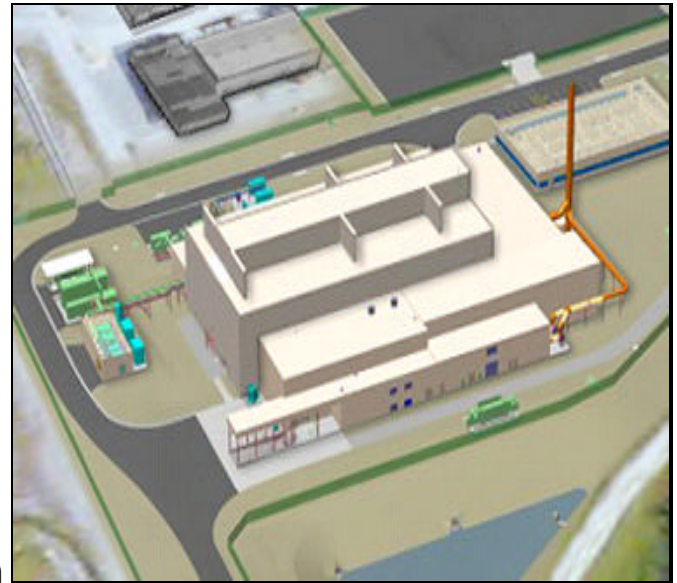
Rapidly and efficiently treat salt waste stored in SRS tank farms to remove actinides, Sr-90 and Cs-137

Scope:

- Remove and concentrate Cs-137 and Sr-90/actinides from salt waste and send them to DWPF
- Send decontaminated stream to Saltstone
- Nominal capacity of SWPF ~6.0 Mgal/yr
- Total volume to be processed ~85 Mgal
- Approved TPC - \$899M
- Completion date (80% confidence level) – November 2013

Status:

- Baseline and initial procurement/construction approved 9/24/07
- Construction underway



DWPF Vitrification

Objective:

Process (vitrify) HLW from SRS tank farms into a stable waste form ready for disposal in the Federal Repository

Scope:

- Design started in 1977
- Construction began 1983
- Radioactive operations began March 1996
- Sludge feed currently being processed from old style tanks to meet regulatory commitments

Status:

- Poured over 2,480 canisters to date
- Continuing to optimize process performance



Saltstone Facility

Objective:

Process low activity salt stream into grout for disposition in vaults

Scope:

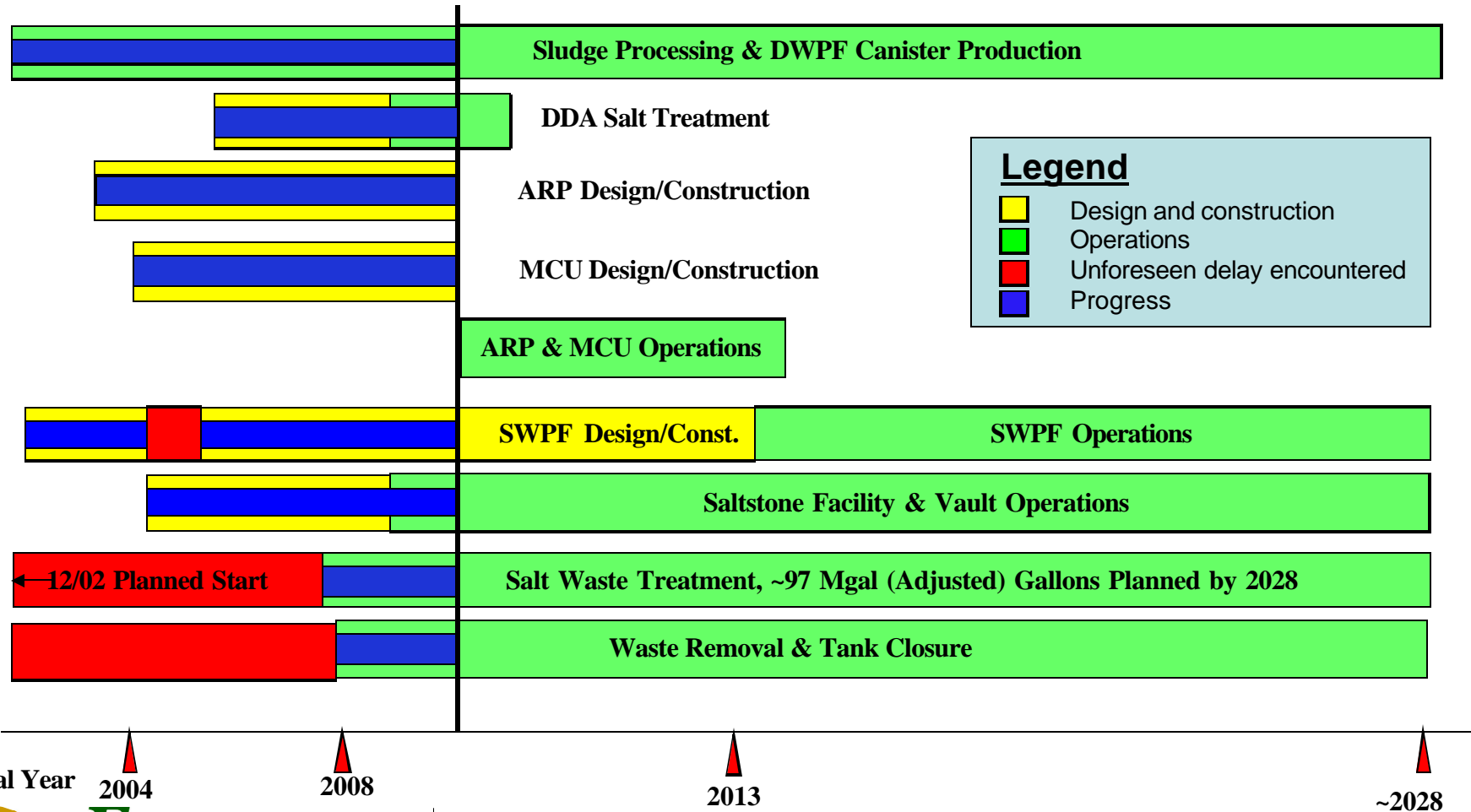
- Aqueous waste mixed with flyash, slag and cement
- Poured in concrete vaults to solidify
- Engineered disposal facility
- Low water permeability
- Excellent non-leaching qualities
- Non-hazardous product

Status:

- Modifications completed 10/07
- Currently processing DDA waste
- Continuing to enhance process



Liquid Waste Project Schedule



Current Challenges - Storage

- **Safely operating aging SRS Tank Farms**
 - Decaying infrastructure and forced outages
 - Strategy: Use system health analysis to identify vulnerabilities and restore selected infrastructure spares via small projects
- **Creating sufficient space to support SWPF**
 - Successful execution of interim processing essential
 - Preparing qualified feed consumes space in the near term due to salt dissolution and sodium adjustment
 - Strategy: Recover Tank 48 and optimize existing infrastructure to recover Tank 50 to high level waste service



Current Challenges - Retrieval

- Federal Facilities Agreement
 - Technology uncertainties and Section 3116 process create risk to 2022 completion date for closure of non-compliant tanks
 - Strategy: Develop and deploy new tank cleaning technologies to accelerate preparation of tanks for closure
 - Strategy: Limit Waste Determination submittals to one per Tank Farm



Current Challenges - Treatment

- **Site Treatment Plan**

- Current estimates of sludge mass and salt processing capability create risk to 2028 date for completion of waste removal and treatment
- Strategy: Timely start of SWPF
- Strategy: Implementation of sludge mass reduction technologies
- Strategy: Employ new melter technologies to increase waste loading and throughput
- Strategy: Potentially augment salt processing through alternative treatment technologies
 - Evaluate small column ion exchange
 - Improve effectiveness of ARP/MCU and operate longer



Current Challenges – Tank Closure

- SR inexperience with public review of performance assessments (PA)
 - HQ support needed to educate stakeholders
- Limited data available to support waste removal to maximum extent practical
- Improved physical property data needed to support waste removal and PA's



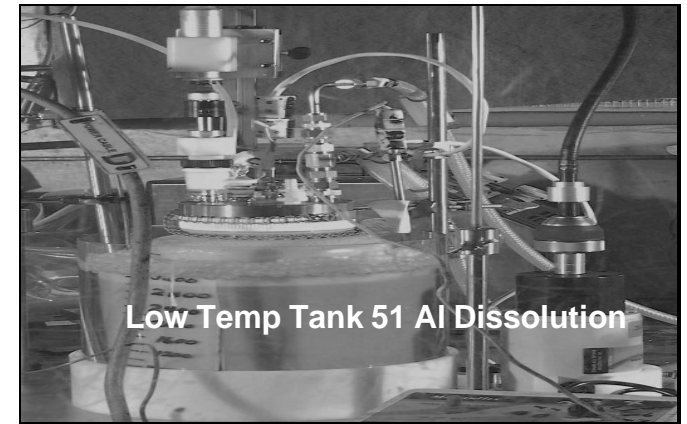
Technology - Ongoing Site Initiatives

- **Tank 48 Recovery Project**
 - Fluidized Bed Steam Reforming
 - Wet Air Oxidation (risk mitigation)
- **Sludge Mass Reduction**
 - Low temperature leaching in Tank 51 reduced aluminum in Sludge Batch 5
- **Sludge Waste Processing**
 - Increased Waste loading in glass and increased melt rate
- **Sludge Heel Removal**
 - Mechanical Cleaning in Tanks 18, 19
 - Chemical Cleaning in Tanks 5, 6

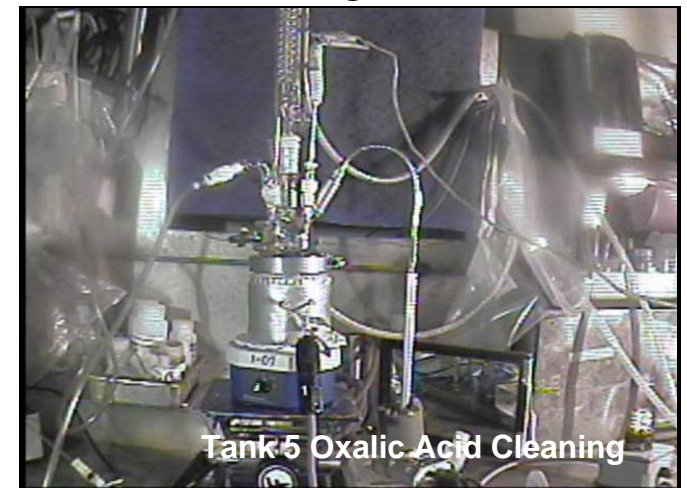


Technology - Needs

- **Waste processing**
 - Increased glass waste loading and melt rate
 - Accelerated sludge batch preparation
 - Vitrification rate increase by melter technologies
- **Augment salt processing**
 - Small Column Ion Exchange
 - ARP/MCU enhancements and life extension
- **Sludge Heel Removal**
 - Develop and deploy Enhanced Chemical Cleaning, to reduce downstream oxalic acid impacts at DWPF
- **Closure**
 - Develop physical property data to support PA's for tank farms and Saltstone, including improved tank closure grouts



Shielded Cells Testing with Actual Waste



Issues

- **Technical**

- Scarce expert resources to perform performance assessments
- Develop physical property data to support PA's for tank farms and Saltstone, including improved tank closure grouts

- **Regulatory**

- A revision process for the WD is needed to allow deployment of new technologies not included in the current WD



Summary

- **Liquid waste processing strategy in place**
 - Sludge and interim salt treatment underway
 - SWPF under construction
- **Many challenges remain**
 - Tank 48 and 50 recovery
 - Sludge mass reduction
 - Enhanced DWPF throughput
 - Augmentation of existing salt processing
- **Ongoing collaborations and investment in new technology are essential to success**

